Environmental impacts of successive mineral fertilization on some properties of soil and plant grown thereon

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This work was carried out to study the effect of long-term successive use and application of different mineral nitrogen and phosphate fertilizers commercially produced in Egypt, as well as potassium fertilizers which imported from out Egypt. The effect of contents from nutrient elements (N, P and K) and some heavy metals (Pb, Cd, Co and Ni) was particularly assessed.Accumulation of such elements of heavy metals in soil and plant in new reclaimed areas at El-Nubaria (loamy calcareous soils) in El-Behira govemorate and El-Bostan (sandy soils), was studied covering lands of different cultivation period (<5, 10 and >20 years) at depths (0-30, 30-60 and 60-120cm).Drainage water samples are collected and plants (root-shoot- grains) samples were taken..The results can be summarized as follow:1-Nitrogen fertilizers content heavy metals, it were found in descending order as follow:Pb> Co> Ni> Cd in case of ammonium nitrate fertilizers, and Pb> Ni> Co> Cd in case of urea fertilizers.2-Phosphatic fertilizers content heavy metals, it were found in descending order as follow:Ni> Cd> Pb> Co3-Potassium fertilizers content heavy metals, it were found in descending order as follow:Cd> Pb> Ni> Co5. Summary and Conclusion -87-4- The classification of mineral fertilizers according to their contents heavy metals was found in these orders as follows:-Content of total Pb:Potassium fertilizers> Phosphatic fertilizers> Nitrogen ertilizers. - Content of total Ni:Phosphatic fertilizers> Potassium fertilizers> Nitrogenfertilizers.-Content of total Cd:Potassium fertilizers> Phosphatic fertilizers> Nitrogen ertilizers.-Content of total Co:Phosphatic fertilizers> Potassium fertilizers> Nitrogen ertilizers.5-Ammonium bicarbonate- DTPA (AB-DTPA) extractable heavy metals in N and K fertilizers were in higher than those extracted by water extract.6-Water extractable heavy metals were in higher than AB-DTPA and probably due to a lower pH of water extract with phosphatic fertilizers, whereas the mean values of the extraction pH was 2.94 and 4.67 for D. water and AB-DTPA extraction, respectively.7-No differences was found between extraction by water and AB-DTPA methods of the investigated heavy metals exceptNi which was in higher with AB-DTPA extractable than water extract.8- Accumulation of macro element N, P and K and heavy metals Pb, Cd, Co and Ni in the sandy soils can be arranged in the descending order as follow:(>20) years cultivation period> (10) years cultivation period> (<5) years cultivation period.5. Summary and Conclusion -88-9-Accumulation of macro element N, P and K and heavy metals Pb, Cd, Co and Ni accumulation in the loamy calcareous soils can be arranged in the descending order as follow:(>20) years cultivation period > (10) years cultivation period > (<5) years cultivation period.10-N, P, K, Pb, Cd, Co and Ni were higher in the loamy calcareous soils than the sandy soils.11-Prolonging the period of cultivation (and consequently fertilization with mineral fertilizers) was associated with increase concentration of the investigated elements in the soils, therefore increasing their contents in the plants grown thereon.12-Available contents of the investigated elements in the sandy soils were greater than in the loamy calcareous soil. This could be due to non-presence of constituents precipitating such elements in the sandy soils as compared with the calcareous one. Available rather than total content of the metal ions is the effective factor in determining the plant content of these metal ions.13-Concentrations of the different elements in the drainage water of the calcareous soil were less than the corresponding ones of the sandy soil and this may have been a high permeability

of the sandy soil as a main factor for increasing concentrations of the different elements in the drainage water.14-NO_3 was detected in higher concentration than NH_4` in the drainage water of water table. This is expected due to the repulsion between the negative charge of the soil and the5. Summary and Conclusion -89-NO_3- ions, and on the other hand the columbic forcebetween the negatively charged soil particles and the NH_4+ ions.15-The lower concentrations of the phosphorus in the drainage water of the calcareous soil than the sandy soil may be attributed, as mentioned before, to its adsorption and/or precipitation of phosphate on $CaCO_3$ particles.16-There is high exposure being in children health in comparison of adults in Egyptian population in all locations soils in accordance with metals concentration trend in soils and biota (grains of maize and wheat plants).17-Main source of hazard from studied elements for human health in all sites occurs due to the concentrations of theseelements in biota in comparison with its concentrations in the soils.18-There were Co hazards for children health in both cases (half and quarter consumption of adults consumption from biota (grains of maize and wheat plants). However there were Ni and Cd, hazards for children in case of half consumption of biota than adults consumption. No Pb hazard for both adultsand children in the location of sandy soils with cultivation period <5 years.19-There were Co hazards for both children health (in both cases half and quarter consumption) and adults .There were Cd hazards for children health in both (half and quarter consumption), whereas there were Pb and Ni hazards for children health in case of half consumption of biota than5. Summary and Conclusion -90-adults consumption in the sandy soils with cultivation period 10 years.20-There were Cd hazards of children health in both cases of half and quarter consumption of biota than adults. There were Co hazards for both adults and children health, whereas there were Ni and Pb hazards for children health only in case of half and quarter consumption of biota than adults in the sandy soils with cultivation period >20 years.21-There were no Cd and Ni hazards for both adults and children health, whereas there was Co hazard for children health in case of half consumption of biota than adults. However there were Pb hazards for both adults and children health in the loamy calcareous soil with cultivation period <5 years. .22-There were Pb hazards for both adults and children health, while, there were Cd, and Ni hazards for children health in case of half consumption of biota than adults. However there was Co hazards for children health in both cases half and quarter consumption of biota than adult in the loamy calcareous soils with cultivation period 10 years.23-There were Pb and Co hazards for both adults and children health, whereas, there were Cd and Ni hazards for children health in case of half consumption of biota than adults in the loamy calcareous soils with cultivation period 20 years.